

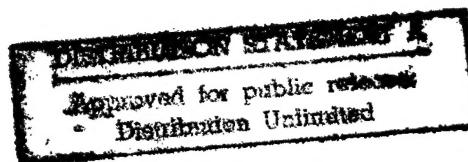
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JPRS-ESA-85-023

30 July 1985

# East Europe Report

SCIENCE AND TECHNOLOGY



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30 July 1985

**EAST EUROPE REPORT  
SCIENCE AND TECHNOLOGY**

**CONTENTS**

**BULGARIA**

- |  |   |
|--|---|
| Applications of Laser Technology Described<br>(BULGARIA TODAY, No 448, 1985) ..... | 1 |
|--|---|

**CZECHOSLOVAKIA**

- |   |    |
|---|----|
| Scientific Involvement in Worldwide Context<br>(PRAVDA, 6 Jun 85) .....               | 7  |
| Anniversary of Czech Nuclear Institute<br>(Miloslav Hron; RUDE PRAVO, 5 May 85) ..... | 8  |
| Research in Immunopharmacology<br>(Blahoslav Braun; RUDE PRAVO, 5 Jun 85) .....       | 11 |
| Drugs Manufactured in Slovakia<br>(PRAVDA, 6 Jun 85) .....                            | 14 |
| <b>Briefs</b>   |    |
| Immunobiological Anniversary .....  | 17 |
| Cooperation in Genetic Engineering .....  | 17 |

**GERMAN DEMOCRATIC REPUBLIC**

- |  |    |
|--|----|
| Heavy Machinery Combine Producing Microelectronic Equipment<br>To Order<br>(Kaethe Aebi; NEUES DEUTSCHLAND, 16 Apr 85) ..... | 18 |
|--|----|

**HUNGARY**

- |   |    |
|---|----|
| Economic, Social Significance of Genetic Research<br>(AKADEMIAI KOZLONY, 14 Nov 84) ..... | 21 |
| <b>Briefs</b>   |    |
| Purchase of Swedish Biotechnology Machines .....  | 25 |
| Robot Engineering Enterprise .....  | 25 |

**ROMANIA**

- |   |    |
|---|----|
| Importance of Automation, Robotization in Economy<br>(Aristide Predoi; ERA SOCIALISTA, No 8, 25 Apr 85) ..... | 26 |
|---|----|

JPRS-ESA-85-023  
30 July 1985

BULGARIA

#### APPLICATIONS OF LASER TECHNOLOGY DESCRIBED

Sofia BULGARIA TODAY in English No 448, 1985 pp 14, 15

[Text] Three years since the launching into space of the Bulgaria-1300 satellite of the Intercosmos programme its equipment is still functioning normally and carrying out the programme of geodesic experiments. These are being done with the help of an optical laser light-reflecting system, a device created by members of the Bulgarian Academy of Sciences' Central Laboratory of Higher Geodesy. This is the first experiment of its kind in the world. During this period more than 70 observation stations have taken part in the experiment, receiving valuable scientific data and making over 3,000 laser measurements to the satellite.

We dwell on this detail because it is part of the ambitious programme of Bulgarian scientists to master laser technology for various branches of the national economy. At a time when there has been talk of a laser war from space and of the terrible power of laser weapons, our country has set itself the aim of using lasers for the sake of progress and the national economy.

The days are gone when lasers were spoken of as some kind of miracle in Bulgaria. Having passed the stage of laboratory tests and experiments, they are now used in industrial enterprises, medical laboratories, agricultural institutes, lecture-halls, as irreplaceable aids to people in their work.

There are two scientific groups in the country which have specialized in R&D activities in the field of laser technology. They are the Optics Scientific Research Institute in Sofia at the Metalchim State Economic Corporation and the Problem Scientific Research Laboratory with a laser technology production department at Sofia University Kliment Ohridski. They are also the main producers of laser equipment--on their production lists figure some twenty different laser devices used to carry out the greatest precision operations in electronics, mechanical engineering, health-care, environmental protection, science, education and culture.

#### Laser Measurements

Lasers can make the finest measurements of all linear dimensions and displacements in precision mechanical engineering, metrology, instrument-making and micro-electronics. These are of the laser ELI-M electroferrometer type based on the

principle of the helium-neon single-phase laser. Sofia University scientists have also come up with the LTA Granat-M laser--a technological apparatus marking device. It can be used to mark finished products, to engrave inscriptions on metal and dielectric parts and to carry out technical operations in microelectronics and other fields of high-precision processes.

#### Lasers in Agriculture

The "Solar" system is used to process seeds earmarked for sowing as a supplementary operation in the overall preparation of seeds for sowing. Such processing increases the seed's energy reserves and the intensive development of physiobiological processes results in a marked increase in crop yields.

#### Lasers in Mechanical Engineering and Science

Lasers can be used to punch holes in sheet-steel and other metals, to cut sheet metals and in research experiments--to generate harmonious wavelengths, to measure distances and to make atmospheric probing.

#### Laser Microscopes

Helium-cadmium lasers enable the magnification of human bodycell from 2,800 to 10,000 times; they find application not only in medicine, but are also used in laser location and navigation, integrated circuit production and fault detection. The Helium-neon lasers are also of this family and are used in medicine for physiotherapy, skin therapy and stomatology.

#### Lasers for Equipment-tuning

These are primarily the small-size Helium-neon lasers which are used to adjust various optical systems. These are used in laser optic-control-measurement devices, in optical electronic information recording and reproduction systems, in biology medicine and scientific research.

The time of the first timid steps in mastering laser devices has long passed. Today Bulgarian scientists daily discover new secrets and applications for laser technology to make for a better future.



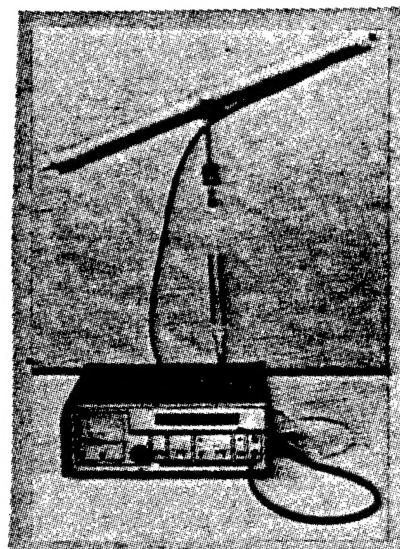
The problem-oriented scientific research laboratory at the Sofia University Klement Ohridski is engaged in the production of two basic series of laser systems--the LTA Granat-M, and the ELI-M laser interferometer for the needs of the national economy. These systems have been launched into production in the plants for electronic equipment and mechanical engineering enterprises. Ivailo Metodiev and Nikolai Georgiev fitting a laser head on an apparatus for the adjustment of integrated circuits.



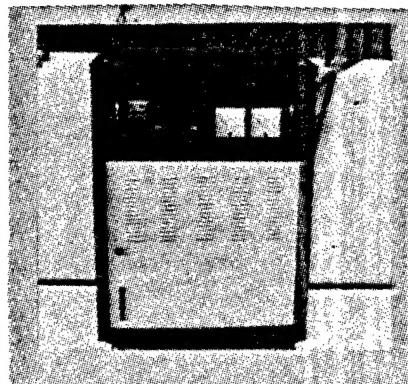
Senior assistant professor Mira Holevich observing the burning of fundus oculi with a laser beam. Laser technology is being broadly applied in medical services. All district hospitals in the country are fitted with laser equipment.



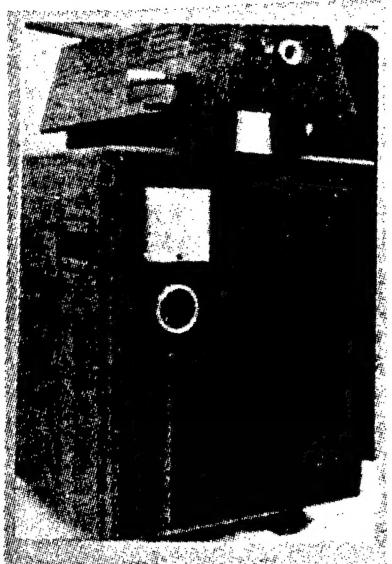
A laser ELI-M interferometer designed for the finest measurements of linear dimensions and displacements in precision mechanical engineering, metrology, instrument-manufacture and microelectronics.



Off-line readjustable tinctorial laser for on-site and remote control of gas pollution of the atmosphere and for biological and medical research



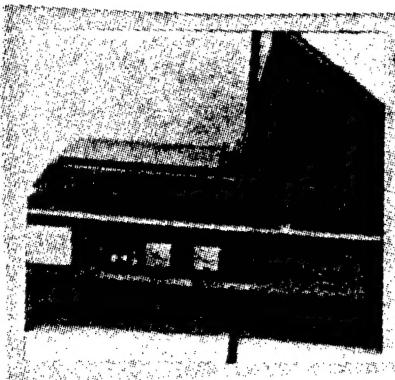
Pulse laser with copper vapours with application in laser location in the atmosphere, in medicine, in the electronic industry.



**Helium-cadmium laser with application  
in navigation and for research in  
medicine and biology**



**A laser system for therapeutic  
application in medicine**



**Solar laser system for lasing in  
plant-growing, with application  
in the pre-sowing processing of  
seeds**

CZECHOSLOVAKIA

SCIENTIFIC INVOLVEMENT IN WORLDWIDE CONTEXT

Bratislava PRAVDA in Slovak 6 Jun 85 p 2

[Text] Prague [Czechoslovak Press Agency]-Questions of the role of scientists in solving basic problems affecting all humanity were the subject of yesterday's press conference at which the press met with participants in the international conference on Socialism and Current General Problems, currently taking place in Prague.

Participants in the conference included delegations from the academies of sciences of the USSR, Bulgaria, Hungary, the GDR, Poland, Vietnam, and Czechoslovakia; representatives of some international institutes; and groups of scientists from the western countries.

In the opening speech, the director of the Institute of Philosophy and Sociology of the Czechoslovak Academy of Sciences, Prof. Dr Jaroslav Pécen, CSc., evaluated the course of the conference to date, during which time over 20 papers have already been presented. He said that the common denominator for all the presentations is an attempt to clarify the nature and substance of general problems and to make progress in searching for ways to solve them.

The head of the Soviet delegation, Corresponding Member of the Academy of Sciences of the USSR Ivan Frolov also took part in the discussions. He emphasized the limitless possibilities which the utilization of scientific knowledge can provide in support of the overall development of human society on our planet. At the same time, however, he reminded us of the moral responsibility of scientists to use knowledge to contribute to life. In this context, he critically pointed out the large number of scientists in the western countries who so far have not joined in the peace initiatives of the progressive scientific community of the world and proclaim their false ideas on the so-called neutrality of science.

From the answers to the questions by the press, it was quite clear that the decisive task for now is to prevent a worldwide military conflict. Progressive scientists from the socialist and capitalist countries are fully aware of their role in this process and therefore welcome all possibilities for constructive dialogue aimed at finding a common ground for the solution of problems of co-existence and further development of relations between countries with different social orders. Only with mutual international cooperation will it then be possible to resolve other general world problems, such as questions of doing away with hunger in the developing countries, the threat of an ecological crisis, etc.

CZECHOSLOVAKIA

ANNIVERSARY OF CZECH NUCLEAR INSTITUTE

Prague RUDE PRAVO in Czech 5 May 85 p 4

[Article by Eng Miloslav Hron, CSc, Deputy Director for Research Institute for Nuclear Research in Hron near Prague]

[Text] The Institute for Nuclear Research in Rez near Prague was founded in June 30 years ago. That was after Czechoslovakia accepted the offer of the USSR government to extend assistance in the research on peaceful uses of nuclear power. From the original objective, basic research in the area of nuclear physics, its orientation gradually has been shifting to applied research, particularly in the nuclear power industry field. At present the Institute is the leading CSSR center for research and development of nuclear power systems and technology.

At the present time, we are coordinating five state and three departmental projects of research and development of technology in the nuclear power industry sectors, three state projects in nuclear technology, and we are also participating in the execution of three other state projects in the nuclear energy systems. For the manufacturer of nuclear equipment Skoda Plzen we are conducting irradiation tests on materials for reactor pressure vessels. The results of these tests are an essential basis for ensuring supplies of such equipment in our republic, for the Peoples' Republic of Hungary, and other socialist countries. On behalf of the state supervisory body for nuclear safety, the Institute performs specialized tests of safety regulations and production documentation of the nuclear power plants. We provide experts for reactor and power generating operations of the power plants, whose responsibility it is to take care of the specialized calibration and maintenance of the measuring systems of computers. We developed and standardized a number of computer programs which are essential for the development and control of production in nuclear power plants. We take part in the work for Jaslovske Bohunice, Kukovany, Mochovce, and Temelin. No less important for us is the fact that we have become the guarantor and designer of the technology for processing of nuclear waste for the Czechoslovak nuclear power plants.

In the area of physics research of the cores of constructed reactors, we turn over the results of our calculations to producers and operators and in the case of the newly built reactor LR-0, constructed in cooperation with USSR, we are concerned with the production physics of the core and questions of safety and reliability of pressure vessels of the power generating reactors.

In cooperation with the international economic association INTERATOM-ENERGO, the Institute has the responsibility of formulating Czechoslovak, as well as CEMA, standards for nuclear equipment.

A basic innovation, which nuclear power industry will have to adopt in the coming decades, is the introduction of so-called fast, sodium-cooled reactors, which use nuclear fuel to better advantage. For that reason the Institute will, in close cooperation with Soviet experts, coordinate and work on state projects for the development of science and technology directed toward developing sophisticated equipment for these reactors and their fuel cycle.

The industrial development of nuclear power systems and technology in our country is, as in the whole world, characterized by a rapid innovative process. It is therefore necessary to pay special attention to preparing a commensurate research and development base, directed toward the changing realistic needs of our national economy. What I have in mind is that we should carry out on a preferential basis those projects of an engineering nature which are to be put to specific uses, thereby endeavoring to lend an effective helping hand to the building of Czechoslovak nuclear power industry. This also stems from the fact that the Institute has been under the jurisdiction of the Czechoslovak Commission for Atomic Energy since 1972.

In the reactor physics research sector, our mission is explicitly defined, stemming from current needs of our nuclear power industry. Furthermore, the Institute performs the function of expert guarantor of Czechoslovak participation in both multilateral and bilateral technological cooperation with CEMA member countries in the physics research of nuclear reactors. The first stage of development of reactor physics in the Institute culminated in 1972 by putting in operation a heavy water reactor of zero output TR-0, which aided the research on the reactor core of the first Czechoslovak nuclear power plant A-1 in Jaslovske Bohunice. With the changed concept of our nuclear power system, basing it on water pressure reactors of the type VVER, the content of our research here also changed somewhat. We joined the integrated research into the physics of light water reactor core. We participated in the development of calculation programs, for example, in calculating the criticality and distribution of the neutron flux in the hexagonal geometry of the VVER reactor grids and of the fast reactors as well.

In the 80's the center of gravity has been shifting gradually even more toward the direct application of developed methods for reactor systems and reactors in existing power plants. The tasks of reactor technology are derived from the fact that construction of nuclear power plants in our country has become crucial. That forces us to give priority to concern ourselves with increasing the safety of such equipment. In the area of light water reactors, the research work concerns regimens of the primary radius, improving production conditions and their control and, most of all, questions of safety and reliability of nuclear equipment. We are carrying out research on reactor cooling water loops at the experimental VVR-S reactor, which provides valuable information for cooling water areas exposed to radiation. The research and development of fast reactors is being directed on a nation-wide scale by the Institute in the role of a coordinating work center. For example, together with the Soviet

Union we are directing our efforts toward optimizing the parameters of reactors, experimental research into the processes in fuel rods, etc.

The basic activity in the area of reactor materials is focussed on the service life, dependability and safety of those parts of the reactor which are most stressfully affected by radiation.

In our studies of fuel component behavior, our goal is to improve production effectiveness and service life, with special emphasis on the effects of flaws occurring during normal or temporary running of the reactors. In the case of construction materials, we review the effect of the production environment on the steel of the reactor pressure vessels, etc. Experiments are being conducted in the research reactor VVR-S. For designing production conditions we are constructing probes equipped with special instruments, which will allow long lasting exposure to radiation.

Another contribution of the Institute during the 30 years of its existence is the fact that it trained a number of experts who are now taking part in the construction of our nuclear energy systems in production machine tool factories, and in the designing, operating, and servicing of the power plants.

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CZECHOSLOVAKIA

RESEARCH IN IMMUNOPHARMACOLOGY

Prague RUDE PRAVO in Czech 5 June 85 p 4

[Interview by Blahoslav Braun with Dr Karel Masek, Director of the Institute of Pharmacology of the Czechoslovak Academy of Sciences, Corresponding Member of the CZAS: "New Directions in the Development of Medication"; date of interview not given]

[Excerpts] Almost everybody needs medicine. In Czechoslovakia, where it is distributed free of charge, consumption as well as production is continuously growing. But not only the quantity matters. Health care demands ever more effective medicines and, above all, new medicines. Our foremost workshop of basic research on development and testing of new medication is the CZAS Institute of Pharmacology. We have discussed with its director, the CZAS Corresponding Member Karel Masek the results of the research activity of the Institute's collective.

[Question] Comrade director, how do medicines originate?

[Answer] We are the workshop of basic research, i.e. research that discovers the hitherto unknown principles of the effects of medicine on living organisms. This basic research, exploring untrodden, often unexpectedly sinuous roads, always needs a certain time before its results can be introduced into practical use. I could cite many an example when new medicines were discovered years after the scientists in basic research had found some new principles.

At our institute, we are working now with substances which increase the defense capability of the organism. This is a new specialty; immunopharmacology; its aim is to study new substances influencing the defense mechanism of the human organism. We are, therefore, primarily aiming to strengthen the existing defense mechanism of the organism which is, for some reason, weakened.

In the past few years, this trend started to be accepted worldwide and also in Czechoslovakia and the results are more than satisfactory, although it should be mentioned that we do not have, so far, too many effective substances in this field. But this is understandable, because we are only at the beginning of the research. There are infectious, but also tumorous diseases where the defense ability of the organism is markedly affected. We all know, for instance, that

some people hardly know what a cold or flu are, while others practically never get rid of them. Today, science knows a lot about the reasons for such problems and also that, for example, in the case of some tumor-like diseases the defense mechanisms fail completely. Much was contributed to this field particularly by molecular biology and immunology and immunopharmacology is asserting itself ever more. However, this is not the only problem we are trying to solve at the institute; the other lies in the domain of drugs influencing the nervous system.

[Question] What have you already achieved in this field?

[Answer] The task to develop pain killing drugs has been assumed at our institute by the director of the neuropsychopharmacological department and my deputy, Miroslav Krizak, M.D., DrSc.; under his leadership, the working team has developed these drugs in the relatively short period of five years. They have verified and clinically tested them and introduced them into clinical practice. This was obviously done in cooperation with the n. e. Spofa and several health establishments.

In the present Five Year Plan, we have, at our institute, experimented with and introduced into practical use each year one pain killing drug, professionally known as analgesics. Thus basic research was aided by fast, focused research to solve some real problems of health care.

[Question] What are your experiences in cooperating with the production sector?

[Answer] When basic research discovers a new drug, it is almost always necessary to prepare its production for a longer period of time. It is also important to keep up the interest of the producing enterprises in our research and its results. We have, therefore, been cooperating for many years with the n.e. Medicaments - Dolni Meholupy. Since 1981, this enterprise produced altogether 15 million new types of analgetic combinations, representing approximately Kcs 15 million in merchandise. And this was made possible only thanks to good and useful cooperation. At the beginning of the current Five Year Plan, we have entered as well into close contacts with the department of peptides (substances of proteinuous character) of the Medicaments Plant in Modrany.

[Question] Is it possible to compare our results with those elsewhere in the world?

[Answer] In Czechoslovakia, we were able to catch up with the trend which started in the world ten years ago and as we have achieved some priority results, our immunopharmacological research is highly valued in the whole world. Indeed, we were the first in the world to prove that this group of substances affects not only the immunity system, but the central nervous system as well and that the effect of immunopharmacological substances on both systems is very closely interrelated. Our republic, therefore, has become the only socialist founding member country of the International Immunopharmacological Society, established three years ago. For these reasons, the executive

board decided to have the World Congress in Florence followed up by a symposium, the organization of which was entrusted to Czechoslovakia, namely our institute, in cooperation with the Czech Medical Society. Two hundred and sixty eminent scientists from all over the world came to Prague. For the first time the results of certain very effective drugs prepared by genetic engineering were published and for the first time detailed clinical indications and restrictions of certain types of immunopharmacologicals were discussed. The participation and interest of Czechoslovak clinical researchers were also a great pleasure for us.

Thank you for the interview.

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30 July 1985

CZECHOSLOVAKIA

DRUGS MANUFACTURED IN SLOVAKIA

Bratislava PRAVDA in Slovak 6 Jun 85 p 3

[Text] Since 1956 there has been a plant for the production of immunization medicines in the Presov okres, in Sarisske Michalany. Imuna has shown a relatively rapid development since that time. Along with the production of serums and vaccines, it has gradually expanded the production of blood derivatives, dehydrated human plasma, infusion solutions, dehydrated culture mediums, and diagnostic and dietetic medicines. The enterprise has over 900 employees and the annual production volume is 176 million korunas.

In the past, the most significant success was achieved in the production of animal antitetanus serums. Currently, the largest production volume is in blood derivatives. These are the well-known gamma globulins. The main role of gamma globulin is to suppress infections in the body or preventative protection against some illnesses. Blood derivatives based on immunoglobulin will continue to have priority in the Imuna production program. It is true that the original product has been improved. For example, production is being expanded of medicines which will be injected directly into the veins and have an almost immediate effect. This is particularly important with acute infections.

Another important product for future years will be the infusion solution. Currently there is a shortage of it in our medical services. The current annual production at Imuna, 2 million infusion bottles, has more than doubled. The necessary reconstruction of the production of infusion solutions must therefore be carried out this year and the next. There are similar intentions as far as culture mediums are concerned. The production of virological diagnostic kits is also expanding. Currently they are assisting in the fight against influenza. At Imuna the influenza vaccines Subinvira and Adinvira are currently being produced. Their production to date is being increased and at the same time there are plans for the production of an improved influenza vaccine, Purinvira.

The deputy enterprise director for research and production, Eng Imrich Banda, CSc., stated, "In the Seventh 5-Year Plan, we will bring more than 20 new products into production. There will be no fewer in the Eighth 5-Year Plan, even though currently only 29 professionals work in our research and development base. Despite this, they are working on one enterprise research task and seven research problems within the programs of the state plan. In recent years, we have also been contributing to performing two tasks within the CEMA framework."

New products in medical production are particularly complicated. This is especially true because of the lengthy control testing. Each newly developed medicine must undergo controls by the appropriate institute of medicines. After evaluation, there are preclinical tests, during which it is determined whether the medicine or preparation has any harmful side effects on human organs or the population. Only after all this does the enterprise receive approval for clinical testing and its production and distribution. All this usually takes 4 to 6 years.

But there is also another problem here. In the development and production of new types of medicines, the pharmaceutical industry often runs into two basic problems. Specifically at Imuna in Sarisske Michalany there is no opportunity to carry out complex overall laboratory testing and there are problems with securing the necessary chemicals and raw materials. In the past few years, however, they have found a suitable solution. The complex rationalization brigades (KRB) undertake the tasks. There are now three working at Imuna. Each of them deserves personal attention. The facts about one of them, the KRB headed up by Dr. Milovan Jesic, convinced us of this.

To start with, one should say what the subject of their work is. The disease phenyketonuria occurs in newborns once in approximately six to ten thousand births. As a result of a lack of a certain enzyme, their organism is not capable of breaking down albumin contained in meat, milk, flour, etc. In the past, individuals thus afflicted grew into people retarded in development and mental abilities. Today, each newborn undergoes a checkup so that after just weeks of life the doctors can find out whether it is suffering from this disease. In such a case, the only possibility to avoid having the children grow up as physical and mental cripples is the implementation of a strict diet without any meat, milk, milk or flour products, or legumes from the first days of birth until puberty is reached. This are foodstuffs with a high albumin content. But on the other hand, normal development is unthinkable without sufficient albumin. Science therefore had to assist in developing albumin which the affected organism could process. The starting components of this preparation produced at Imuna under the name Sinfenal are curds and starch. By a complex technological process which lasts 6 days, a sour-tasting white powder is produced from the basic material.

But our Sinfenal, of which 6 tons are produced annually, can be taken only by patients over 1 year old. It also does not contain the trace elements, vitamins, or fats. This means that for the younger patients we have to import these essential elements of their daily nourishment from abroad.

"This started to bother us," says comrade Milovan Jesic. "We said to ourselves that if the Americans can learn to produce this, we must also be able to do so. And so a preparation was placed on the program which would be enriched by fats, vitamins, and trace elements and which would moreover be applicable not only as the necessary component for nourishment for people with phenyketonuria, but also for patients with serious postoperative conditions. However, for developing it we lacked the necessary laboratory equipment, as well as the experience, and so we therefore decided to resolve the problem by forming a complex rationalization brigade. We requested cooperation by specialists from the research institutes which have the laboratory equipment and the experience in specialized fields of science."

This is how the complex rationalization brigade was formed at the beginning of the 1980's, whose members include scientists from Kosice and Prague. A truly unselfish cooperation has developed. In the first stage, they resolved to enrich Sinfenal with the trace elements -- sodium, potassium, calcium, magnesium, iron, copper, zink, manganese, and phosphorus. Today the problem has already been solved and an enriched Sinfenal is in the preclinical tests. The time is thus not far off when we will be able to say that we have another world-class pharmaceutical preparation.

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CZECHOSLOVAKIA

BRIEFS

IMMUNOBIOLOGICAL ANNIVERSARY--Participants at a scientific conference in Prague of the EPU Institute of Serology and Immunology remembered the 60th anniversary of the creation of immunobiological production in Czechoslovakia. Some 150 specialists from the entire CSSR evaluated the contributions and further tasks of this scientific research and production base. Among the most important successes of the EPU are the development and production of polio vaccine, combined diphtheria, whooping cough and tetanus vaccine as well as measles and influenza vaccines. [Text] [Prague RUDE PRAVO in Czech 16 May 85 p 2] 12707

COOPERATION IN GENETIC ENGINEERING--An agreement on mutual cooperation in genetic engineering and other biotechnical methods was signed on Wednesday in Prague by the Vice-Chairman of the Czechoslovak Academy of Sciences (CZAS) Academician Josef Riman and the Deputy Minister of Agriculture and Nutrition Ondrej Vanek. The aim of this long-term agreement is to improve the quality of mutual cooperation and to intensify the coordination of research methods of genetic engineering and other biotechnologies in animal and plant production, in veterinary services and food industry and to assist in the acceleration of their transfer into practical use. [Text] [Prague RUDE PRAVO 16 May 85 p 2] 12707

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30 July 1985

GERMAN DEMOCRATIC REPUBLIC

## HEAVY MACHINERY COMBINE PRODUCING MICROELECTRONIC EQUIPMENT TO ORDER

East Berlin NEUES DEUTSCHLAND in German 16 Apr 85 p 3

[Article by Kaethe Aebi: "Microelectronics To Order From In-House Production"]

[Excerpt] At the end of April in the Magdeburg Ernst Thaelmann Combine, in honor of the 40th anniversary of the liberation, there will go into operation the first section of a microelectronics center. Thereby the heavy machine-builders intend to meet an important obligation springing from their 1985 competitive program and at the same time to honor their revolutionary ideal. Researchers and modelbuilders are moving into a redesigned former industrial building. Then in stages up until the 11th party congress mass production manufacturing of microelectronic component groups and devices will be undertaken. At the same time the development of the requisite programs will begin on a more extensive scale.

First there will be a beginning of the SKET Microelectronics Center with 70 trained specialist personnel. Next year this number will be increased to 100. Consistent with the long-term scientific-technical design of the combine, the capacity of this new domain will have doubled by 1990. Thus there will be created prerequisites of decisive importance for producing a future capacity to offer complex automation systems under the trade names of "SKETmatic" and "SKETelektronik."

The Magdeburg combine has developed into a reputable exporter of machines and installations as well as into a productive manufacturer of rationalizing equipment for GDR industry. Its supplier program includes rolling mill equipment, cable- and rope-twisting machines, cement facilities and special-purpose cranes. Why is such importance now being attributed to the creation of our own research and manufacturing capacities in the domain of microelectronics?

### More Than a Third of the Products Are New

General director Martin Hesse has listed for us the decisive motivations in this area: "At this year's Leipzig Spring Fair we found once more confirmed those tendencies which our party has repeatedly drawn attention to. The field of application of microelectronics has on a worldwide scale increased immensely in all areas. And since in our republic we have also achieved a significant level already in this decisive domain it is now proper that we should

make further rapid advances in the utilization of microelectronics for raising the level and tempo of development of new products and technologies in order to achieve a marked rise in productivity and efficiency."

Correspondingly, the SKET collectives have formulated their competitive goals in anticipation of the 11th party congress as follows: At a renovation factor of more than one-third we expect this year to equip 80 percent of all primary products with microelectronic control and surveillance systems. The enormous development which lies behind this process may be clearly seen by a glance at what has been achieved: In 1978 the combine offered its first product involving microelectronic components. In 1983 the first installation involving microcomputers was delivered. This was a cable-twisting machine.

The goals for 1985--according to general director Hesse--are to achieve decisive guarantees in order to be able to compete internationally with products which possess a high level of serviceability and whose production cost is as low as possible. "Our new basket-type cable-twisting machine, which received a gold medal at the Leipzig Spring Fair, is our most current example of this. The use of microelectronics yields enormous gains in efficiency to the customers."

In parallel to this the SKET collective is consistently further pursuing the comprehensive rationalization of entire manufacturing sections in order to increase efficiency in its own production process. In summary, this year it is expected that there will be a 16.3-percent growth in net production. This will result from, among other things, a 7-percent lower use of rolled steel and a 10-percent lower expenditure of energy and also a saving of 65,000 work hours over plan--all resulting from the extensive use of microelectronics and robot technology.

Therefore: "The rapidly increasing claims of microelectronics to usefulness in production and its rapidly broadening area of application constitute today a challenge to every combine, every plant, every collective." And in our conversations it was made clear that the Thaelmann workers concur in this without reservation.

#### Keeping a Lead in Knowledge for Future Tasks

Nevertheless, statements by these workers which today sound so obviously true were just a short while ago by no means evident to everyone. To dally with printed circuits and microchips seemed to many engineers to go against his honor as a builder of heavy machinery. They maintain that the old proverb about the shoemaker sticking to his last was still in force.

Comrades of the party organization answered this with the argument that nevertheless nothing was to be gained on the world market with "old shoes." But we must be capable of competing if we are to make a fitting contribution to the continuation of our good policy with respect to the main task and to the preservation of peace. And both now and in the future that is bound up more than anything else with the key word "microelectronics." Sales experts described their own experience and pointed out that also the other internationally

reputable producers of heavy machinery had built up their own significant potential in microelectronics.

From the clarification of such interrelationships there was but a straight path to the plan which aims at setting up our own microelectronics center and which will extract from this--naturally, while using commercially available structural components, circuits and devices--whatever is best for the process of bringing innovation to our products.

In parallel to the creation of appropriate capacities, there has been established a program for the development and employment of the requisite cadre of personnel, beginning with in-house training of electronics specialists, continuing with the acquisition of additional graduates and leading to a long-term continued education. Only last year the plant academy with the vigorous cooperation of the Chamber of Technology trained and gave continued training to 1,200 Thaelmann workers in the area of microelectronics and robot technology. In order to meet the new demands a new specialist section for automation technology was formed in 1984 by the factory section of the KDT in the SKET.

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HUNGARY

## ECONOMIC, SOCIAL SIGNIFICANCE OF GENETIC RESEARCH

Budapest AKADEMIAI KOZLONY in Hungarian 14 Nov 84 pp 208-209

[Text] The presidium of the MTA [Hungarian Academy of Sciences] has commissioned the Division of the Biological Sciences to make a study of the economic and social importance of genetic research--an interdisciplinary field of great social significance--which should give a comprehensive overview of the scientific, economic, and social problems accompanying the development of this field of knowledge.

Preliminary analyses have been performed by the Genetics Committee of the MTA. A summary of these was reviewed by the Division of Biological Sciences with the cooperation of the other divisions concerned, then it was discussed at a round-table conference. The re-worked study, incorporating the results of the conference was again debated in the Division of Biological Sciences, and a commission was sent out to prepare the proposal to be submitted to the meeting of the presidium.

This proposal gives a short account of the development of genetics and states that today's genetics is a fundamental discipline of biology and biotechnology. Following this it discusses the social significance of genetics. A separate chapter is devoted to the analysis of the status of genetics in Hungary. It emphasizes that the concerns also present in other fields of scientific life apply to genetics, namely that a small country can keep up with the rapid pace of the development and diversification of science only if it concentrates its universities while developing them; if it can develop a selection system which guarantees the constant influx of the most gifted to the universities; if it can provide modern facilities for these outstanding people and if it can solve the problem of permitting every researcher to stay in constant contact with foreign institutions in his field that have large numbers of investigators. Furthermore, the proposal states that the status of genetic research in Hungary is very uneven. The situation is relatively good in fundamental research in molecular genetics and in genetic engineering and in somatic cell genetics. Cytogenetics also represents an acceptable level of achievement. Less satisfactory is the situation in classical genetics research done on whole organisms and the status of the affiliated human and material resources.

In the debate concerning the proposal the general opinion was formed that genetics is one of the most important areas of science of our age, the

development of which due to its decisive role in economic and social issues must be supported with a high priority, more strongly than in the past. The increase in support is particularly essential in the realm of research connected with agricultural production. Unquestionably, one must update the instrumentation needed for research, and the cooperation between universities and the research institutes must be intensified. Several people remarked that the proposal did not contain data documenting the position of Hungarian genetic research and its failings, especially as compared with other socialist countries. Some speakers criticised the fact that the proposal did not mention the experience with an earlier directive of the presidium regarding research in plant genetics, and the activity of the joint MEM [Ministry of Health and Nutrition]-MTA committee.

The weaknesses of the cooperation between the Biological Center of Szeged (SZBK) and the Agricultural Research Institute of Martonvasar were brought to light as well as the unreasonable separation between theoretical and practical research work. Even the question of the need for a reexamination of the founding document of the SZBK was raised. The speakers added many remarks aimed at complementing and focusing the statements closing the debate on the proposal.

#### Directive No 30/1984 of the Presidium

1. The presidium accepts the proposal and expresses its thanks for the valuable preparatory work.

It recognizes that genetics, and within this, the new branch of biology, genetic engineering, has achieved a central importance in the area of the biological sciences and that the achievements of genetics are employed in an ever widening field of our society, in industrial and agricultural production and in the health fields. It also notes that in order to develop genetics science that can be a productive force, both the fundamental sciences and applied genetic research must be cultivated on a wide basis and must be taught on a high level.

The presidium furthermore recognizes that practice-oriented research cannot be successful without the parallel development of other fields relating to living organisms (physiology, biochemistry, biophysics, microbiology, etc.) and that within the field of genetics both "classical" and molecular genetics are necessary for successful work. It regards therefore as incorrect the attitude that views classical and molecular genetics as opposing forces, when these approaches complement each other. The techniques of both fields must be developed before valuable results can be achieved. Classical genetics is also evolving, its methodology is constantly enriched and its knowledge and cultivation are in many cases of dominant practical importance today.

Based on the preceding, the presidium approves the proposals submitted to it as follows

2. The presidium finds it necessary that the academy start an independent program extending over several years, for the development of fundamental

genetic research, in order to assure its personal and material basis. It asks the Ministry of Industry and the Ministry of Agriculture and Nutrition and the Ministry of Health to contribute to the financing of this program.

3. The presidium suggests that the Ministry of Industry and the Ministry of Nutrition ask those factories and organizations which are under their control and which utilize living organisms (microorganisms, plants, animals) in their productive activity about their plans for the culturing/breeding of these organisms and about the magnitude of the research and development effort which they plan to conduct in order to achieve their goals. The academy offers to provide its experts for the evaluation of the results of this study if the ministries so desire and it also recommends that the research and development institutes under the control of the aforementioned ministries enter into a closer working relationship with the corresponding research groups of the academy, respectively the university departments.

4. The presidium urges that the Ministry of Culture, the Ministry of Health and that of Agriculture and Nutrition help with all means at their disposal the genetic work conducted in the research institutions and other laboratories under their control and that they put the teaching of genetics on a new basis. Such teaching should be strengthened by the participation of internationally recognized scientists. Biology and those of its subfields (biochemistry, biophysics, microbiology, mathematics) that are necessary for the health of molecular biology should be supported. It also recommends to these ministries that the appropriate bodies of the Academy be more intensively and regularly involved in the work of preparing and executing decisions concerning genetics.

5. The presidium finds it necessary for the research institutes, laboratories and researchers of the Academy to support the OKKFT A/16 program and that they participate in its execution. It also recommends that within this program a proportionate amount of effort be spent on the support of basic research. It asks the academic institutions and the chief supervisory bodies of the universities to give the necessary support to postgraduate training which is to be organized within the framework of the OKKFT A/16 program, with the coordination of the MTA's Division of Biological Sciences.

6. The presidium urges increased cooperation between the institutes of the academy having a genetics profile. It recommends that the Biology Center of Szeged, the Agricultural Research Institute of Martonvasar and the Research Institute for Plant Protection work out a common research program.

7. The presidium asks the officials of the MTA and the concerned ministries in charge of international relations that in the distribution of the funds under their disposal genetics be treated with priority and that they increase the number of scholarships and trips to conferences and workshops.

8. The presidium recommends that a study, a program and a plan be developed by the supervising ministries concerning the level of the instructional work in genetics, its conditions, subject matter and development, and that the study, program and plan be debated by the Genetics Committee of the MTA, by the Mixed Committee for Human Genetics of the MTA and the Ministry of Health and finally by the Division of Biological Sciences.

9. The presidium finds it necessary to assess the execution of its directive No 36/1980 concerning the development of genetics; it asks the Division of Biological Sciences to supervise the execution of the present directive also, and to report on its status to the presidium in three years.

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HUNGARY

BRIEFS

PURCHASE OF SWEDISH BIOTECHNOLOGY MACHINES--The Phylaxia Vaccine Producing Enterprise is participating in the national biotechnology program. This enterprise, which makes substances essential to the field of veterinary medicine, has equipped itself for propagating cells and viruses by the most modern procedures currently known. Through this move which was assisted by the National Technical Development Committee vaccine production will be up-dated as the result of a 9 million forint investment for the time being. Such modern biotechnological methods are now being adopted on an industrial scale throughout the world. To introduce it, Phylaxia has purchased machines which have already arrived from Sweden. The equipment will be computer controlled. Specialists believe that it will reduce the cost of producing vaccines. [Budapest NEPSZABADSAG in Hungarian 3 Jul 85 p 9]

ROBOT ENGINEERING ENTERPRISE--An investment association for the development of robots and manipulators has been established under the name of Roboplan. Participants are the Rekard Agricultural Machine Factory of Gyor, the Construction Industry Innovation Fund and the Agrarian Innovation Association. The founders have contributed initial capital in the amount of 10 million forints to support operation of the new enterprise: Rekard has provided 50 percent while the two small banks have each contributed 25 percent. The new technical development enterprise will design and develop electronically controlled robots and manipulators, arrange for serial production and will even undertake the construction of prototypes. The central office of the association where planning and technical development are carried out is located in Budaors. The production unit will be set up in Abdan in Gyor-Sopron County at one of the plants of the Rekard Agricultural Machine Factory. According to preliminary surveys, the greatest need is for robots and manipulators in the food and construction industries. Founders of the association expect to put successful products on foreign markets eventually. [Text] [Budapest MAGYAR HIRLAP in Hungarian 9 Jul 85 p 7]

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ROMANIA

## IMPORTANCE OF AUTOMATION, ROBOTIZATION IN ECONOMY

Bucharest ERA SOCIALISTA in Romanian No 8, 25 Apr 85 pp 9-11

[Article by Aristide Predoi]

[Text] "Particular attention must be devoted to the construction of modern, automated lines based on automation and robotization, particularly in sectors which require great physical efforts and present difficult working conditions. We must not forget for one minute that greater labor productivity is the only way by which we can assure our socioeconomic development and cause Romanian products to be internationally competitive." Nicolae Ceausescu

In the twenty years since the Ninth Party Congress, Nicolae Ceausescu has brilliantly proven to be the leading strategist for the balanced development of Romania's entire socioeconomic life and all branches of the economy, by implementing technical progress and the latest advances of science and technology. Even during the early years of this period--most justifiably called the "Nicolae Ceausescu Era," the most fertile in Romania's history, the era of our nation's greatest achievements--the secretary general of the party emphasized that the sustained development and diversification of the automation industry imposes itself as an objective necessity for the development and modernization of the entire industry. In his report to the Ninth Congress, starting with the imperative need to steadfastly encourage all that is new and advanced, Nicolae Ceausescu stated: "To meet the need for electrical machinery and instruments, and for measurement, control, and automation instruments, the production of the electrical industry will reach the highest rate in the machine building industry. It will be necessary to expand the basis of the electronic industry, an industry which is exceptionally important for the future development of the economy, and which determines the expanded automation of production processes in keeping with the requirements of the technical and scientific revolution."

### Objective Need to Develop and Modernize the Entire Industry

The perspective of the last two decades in the development of automation in Romania shows the extremely rapid progress of the electrical and electronic industry, and of the industry which produces automation devices, equipment,

and installations derived from the designs and sustained efforts of our researchers and specialists. Along with the Automatica enterprise, whose 1965 production reached 65 million lei/year, new modern units have appeared in the past five-year plans, such as the Enterprise for Automation Devices and the Electrotehnica enterprise in Bucharest, the Enterprise for Pneumatic Devices and Measurement Instruments in Birlad, the Enterprise for Transducers and Direct Regulators in Pascani, the Enterprise for Electrical Panels and Displays in Alexandria, the Enterprise for Electropneumatic Panels in Bacau, the Industrial Electronics Enterprise for Automation in Cluj-Napoca, and so on, units which in collaboration with the Institute for Scientific Research and Technical Engineering for Automation and Telecommunication (IPA) and with its subsidiaries in our country, have built products for automation and process computer technology. In 1980, the value of these products was 90 times higher than the 1965 production, and the 1985 production is expected to satisfy more than 98 percent of the domestic needs (see table) as well as an increasing volume of products for exportation.

**Supply of means of automation (percent)**

	<b>From domestic production</b>	<b>Imported</b>
1965	48.0	52.0
1970	80.0	20.0
1975	87.0	13.0
1980	92.2	7.8
1985	98.5	1.5

The design, adoption, and production of these means of automation, characterized by an increasingly higher technical level of components, have constituted original activities, utilizing our domestic technical and scientific intelligence, thus creating means of automation which have undergone a rapid evolution, moving directly into the second generation and reaching the present stage of the 3.5-4 generations. At the same time, sustained actions were conducted to systematize, orient, specialize, and standardize devices, equipment, and systems, with applications in technical tooling and installations for continuous and batch, slow and fast processes in all branches of the economy, as well as for the exportation of complex systems.

All these results are an expression of the perseverance with which we have acted to fulfill the tasks established by party programs regarding the sustained growth of labor productivity, particularly through systematic improvements in product technology and quality, and through the superior utilization of all the country's resources. The achievement of these objectives imposes the broad introduction of very modern production processes in the existing technology, processes which use automation, robotization, and computerization. As has been repeatedly stated by Nicolae Ceausescu, advancing from the stage of developing nation, raising our country to increasingly higher steps of progress, can be achieved only by a strong growth in labor productivity to the level attained by economically developed nations; and this requires first of all a more intensive creativity in order to expand

mechanization and automation, robotization and computerization, the most rapid possible transfer of new ideas into production, while reducing the consumption of energy, raw materials, and materials, and intensively introducing into production standardization, miniaturization, and microminiaturization.

In this respect, the Program to More Strongly Increase Labor Productivity During the 1983-1985 Period and Until 1990, as well as the Program to Improve the Technical and Qualitative Level of Products, Reduce the Consumption of Raw Materials, Fuels, and Energy During the 1983-1985 Period and Until 1990, both of which were formulated at the direct initiative and under the direct guidance of the secretary general of the party, constitute guidelines for all workers involved in automation activities. These guidelines are essentially aimed at the country's progress toward a constant modernization of technologies, the wide scale utilization of cutting edge science and technology, and the development of automation, which ultimately determines technical progress in all the other branches of the national economy.

According to the Orientations Established by the 13th Congress Regarding Romania's Socioeconomic Development During the 1986-1990 Five-Year plan and in the Future Until the Year 2000, the electronic industry is expected to penetrate massively into the whole socioeconomic activity, which in turn will be oriented toward priority development in the production of components, means of automation, and industrial and professional electronic equipment. "We will have to decisively complete the programs aimed at the mechanization, automation, and robotization of all economic sectors," said Nicolae Ceausescu. "The general lines of the intensive reorganization of all sectors will be completed by 1990. Romania's industrial production and its quality and technology, will reach a general level comparable to that of economically developed countries."

#### Superior Utilization of Domestic Design

There is a greater acknowledgement at present that socioeconomic development, and industrial development in particular, are inconceivable without the contribution of automation, properly called the cutting edge of electronics. The branches producing means of automation, electronics, and computer technology, are those which derive the highest value from materials, labor, and intelligence, leading to the fabrication of products of very high value, which at the same time consume minimum amounts of materials, energy, and human effort. At the same time, the automation, electronic, and computer equipment incorporated in technical tooling and robots, significantly increase the value of the latter--through software programs and artificial intelligence, improve their efficiency, make them more flexible in operation, and increase man's management abilities.

By intensifying the redesign and modernization of products in current fabrication, improving the planning of those being adopted, and extending the range of high technology products, the proportion of international class products in Romania will increase from about 69 percent in 1985 to 84.6 percent in 1987, and will approach 95 percent in 1990. Similarly,

between two and five percent of the products will surpass the international level. At the same time, in order to assure the established levels of labor productivity growth, particularly in sectors with heavy labor demands, the proportion of the production achieved with mechanized and automated systems will reach an average of 65 percent in 1985, about 70 percent in 1987, and over 90 percent in 1990.

It is expected that by 1990, the continued restructuring of processing branches and advanced utilization obtained from the development of high technology, low energy demand, production sectors--such as microelectronics, industrial robots, equipment for nuclear power plants, for new forms of energy, and for aviation, as well as laser and fiber optics equipment--will lead to products whose performance/cost will be twice that of 1985, while defining the 2-5 percent group of products whose technical and qualitative level exceeds international levels.

In achieving these objectives, scientific research and technical engineering in enterprises, research institutes, and higher education will have to play a significant role by placing particular emphasis on the most efficient exploitation of domestic design and intelligence. In this respect, on the basis of an integrated computer system, a transition will be effected to computer-aided research and design and to computerized production control, thus further contributing to the reduction of physical effort and to greater labor productivity in both design and execution activities. At the same time, this will intensify standardization as well as the reutilization of various solutions, and even the standardization of some components and sub-assemblies--with significant consequences on increasing the quality of material production.

In the context of this problem, scientific research and technical engineering are oriented primarily toward the completion of such programs as: the computer-aided research and design program, which involves the Technologic Research and Design Institute for the Machine Construction Industry, and the Titan Institute for Scientific Research and Technical Engineering in Bucharest, for the mechanical part of the project, and the Electronics Industry Research Institute, the Computer Technology Research Institute, and the Automation Research and Design Institute for the electronics portion, together with units from the electrical, electronics, machine-tool, and machine construction industries; the computer-aided automatic testing program, which involves the Automation Research and Design Institute, the Computer Technology Research Institute, and the Electronic Components Research Institute, together with units from electronics and automation industry, as well as automation schools and departments at the polytechnic institutes of Bucharest, Cluj-Napoca, Timisoara, and at the University of Craiova; the robotics program which involves scientific research and technical engineering units of the Central Institute for Machine Construction, industrial machine construction units, the Central Institute for Management and Information Technology, as well as specialized departments of Romanian polytechnic institutes and universities. All these programs are combined under the National Program for Flexible Systems, which is coordinated by the National Council for Science and Technology.

## Decisive Role of the Human Factor

The experience gained in various countries shows that the use of microprocessors reduces by 30-60 percent the duration of product adoption and placement in fabrication; that as a result of the introduction of robots, production processes can be carried out in two shifts without requiring human supervision, with a single person being capable of fabrication preparation in a single shift; that flexible production systems strongly reduce the proportion allocated to transportation, positioning, measurement, and other operations during machining time.

It should however be mentioned that most often, the introduction of automation and robotization does not represent a simple substitution of machines for men, or of one piece of equipment or tool for another, but also a reorganization of technical processes and the requalification of personnel for the new knowledge required by the new system. Also required very often are changes in supplier deliveries and customer distribution, with consequent modifications of operating regulations and the regulations governing the maintenance and utilization of technical resources.

As a result, it can be concluded that the introduction of a new system or equipment requires the statement of a new concept of the relationship between new processes and labor productivity. In our opinion, it is necessary that the researcher or designer have a new vision which will be based on the most advanced knowledge, on one hand to improve the performance of the equipment or instruments, and on the other to introduce and adapt these as rapidly and efficiently as possible to the specific production of the various branches of the economy.

We thus perceive the need for a new view of labor productivity, based on an economic, modular, standard design of equipment and systems, together with multiple possibilities for expanding their validity to other areas. For instance, systems for monitoring oil-well fields through remote data processing and transmission equipment, can be expanded to gas wells and even to irrigation systems, to monitor pumping stations or tooling scattered in fields or territories, as well as to other industrial or economic-financial branches. At the same time, there is a need to bring the solutions formulated here in line with those available in the world technology, so that they may be introduced into the international circuit of values, thus assuring our country's active participation in the international division of labor, and opening new possibilities for increasing exportation.

As a result of the rapid progress achieved today in the development of advanced technologies, of the new man-machine relationships created by the broad scale introduction of automation and robots, and of the impact of microelectronics and process computers, changes have occurred in the quality of work and life, in the relations between human and artificial intelligence, and the growth in the productivity of social labor. All of these have led to essential changes in the character and level of personnel training, in the concepts and psychology of man, a situation in which the difference between

physical and intellectual labor is gradually being erased. Under these conditions, it appears quite natural for every worker to constantly renew his store of knowledge so as to meet the demands of the new stage in the modern technical and scientific revolution.

Starting with the social determinations and implications of the new technologies, we reach the conclusion that in our times, man, viewed in terms of his level of training and creative ability, becomes increasingly the decisive factor of the entire socioeconomic progress. "We must not forget for one moment," the secretary general of the party pointed out to the Third Congress of the FDUS (Front for Socialist Democracy and Unity), "that the decisive role in the entire development is played by men, by their level of professional, technical, scientific, and cultural training, and that consequently, improving the level of all this knowledge is a necessity for the continued development of our nation!"

The powerful development of our electronic and automation industry during the past two decades, reflects the creative concept, the foresight of Nicolae Ceausescu, the secretary general of the party, the brilliant promoter of Romanian science and technology, of the optimum blossoming of their results in all areas of the socialist construction, through the joint efforts of research, production, and education. Deeply involved in fulfilling the objectives established by the 13th Congress, benefiting from the orientations of the broad programs for scientific research, technical development, and introduction of technologic progress--formulated under the leadership and with the contribution of academy member, doctor, engineer Elena Ceausescu, a scientist of international reputation and chairwoman of the National Council for Science and Technology, the workers engaged in research, design, and production in automation and robotization, are constantly increasing their efforts to achieve under the best conditions the provisions of these programs, conditions that are decisive for the country's multilateral and dynamic progress, and for the building of the multilaterally developed socialist society and advancement toward communism.

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